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1: Environ Mol Mutagen 2000;36(1):5-12

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DNA degradation by the mixture of copper and catechol is caused by DNA-copper-hydroperoxo complexes, probably DNA-Cu(II)OOH.

Schweigert N, Acero JL, von Gunten U, Canonica S, Zehnder AJ, Eggen RI.

Swiss Federal Institute for Environmental Science and Technology (EAWAG),
Dübendorf, Switzerland.

Free hydroxyl radicals (free (\cdot)OH), singlet oxygen ($(^1\text{O}_2)$), or (\cdot)OH produced by DNA-copper-hydroperoxo complexes are possible DNA-damaging reactive oxygen species (ROS) in the reaction system containing copper, catechol, and DNA. para-Chlorobenzoic acid (pCBA) degradation studies revealed that CuCl_2 mixed with catechol produced free (\cdot)OH. In the presence of DNA, however, inhibition of the pCBA degradation suggested that another ROS is responsible for the DNA degradation. Of a series of ROS scavengers investigated, only KI, NaN₃, and Na-formate—all of the salts tested—strongly inhibited the DNA degradation, suggesting that the ionic strength rather than the reactivity of the individual scavengers could be responsible for the observed inhibition. The ionic strength effect was confirmed by increasing the concentration of phosphate buffer, which is a poor (\cdot)OH scavenger, and was interpreted as the result of destabilization of DNA-copper-hydroperoxo complexes. Piperidine-labile site patterns in DNA degraded by copper and catechol showed that the mixture of Cu(II) and catechol degrades DNA via the intermediate formation of a DNA-copper-hydroperoxo complex. Replacement of guanine by 7-deazaguanine did not retard the DNA degradation, suggesting that the DNA-copper-hydroperoxo complexes do not bind to the guanine N-7 as proposed in the literature. Copyright 2000 Wiley-Liss, Inc.

PMID: 10918354 [PubMed - indexed for MEDLINE]

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